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10/749,670	12/30/2003	Deok-Yong Kim	2522-047	9761

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EXAMINER	
ROSARIO, DENNIS	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/749,670	KIM ET AL.	
	Examiner	Art Unit	
	Dennis Rosario	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 8/31/07.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-27 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-27 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 30 December 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment was received on 8/31/07. Claims 1-27 are pending.

Response to Arguments

2. Applicant's arguments on page 8, first sentence filed 8/31/07 have been fully considered but they are not persuasive and states:

"Kuwabara does not operate with a threshold 'region including at least one pair of upper and lower limits.'"

Note that the claimed region was not found with an associated definition; thus, Plain Meaning will be used to define the claimed "region" as a range of values.

The examiner respectfully disagrees since Kuwabara does operate with a threshold region (or a region between two thresholds as implied from "a second threshold...is larger than the first threshold value" in col. 5, lines 62,63) including at least one pair of upper (or said second threshold that is higher or larger than the first threshold and has a certain limit or range that specifies a certain defect) and lower limits (or said first threshold that is lower or smaller than the second threshold and has a certain limit or range that specifies a certain difference value).

3. Applicant's arguments on page 9, lines 4,5 have been fully considered but they are not persuasive and states:

"A further differentiation is that the invention...compares the 'raw datum' of the grey level difference with the threshold region."

The examiner respectfully disagrees since Kuwabara does compare (fig. 11,num. 224) the raw datum of the grey level difference (fig. 11,num. 223) with the threshold region (or said region between the two thresholds).

Thus, for example if fig. 11,num. 224 outputs "YES" which means the difference value was determined to exceed the third threshold which is the same as the "first threshold value" in col. 10, line 16 which means that the difference value is above the first threshold, but below the second threshold or in other words is said region between two thresholds since "only one condition [is] required for the third threshold value [which] is its ability to detect the difference [as detected by the first threshold]...(col. 10, lines 13,14)." Thus, a difference detected by the third threshold includes at least the range between the first and second thresholds since the **only** (emphasis added) requirement is to use the first threshold and not the second threshold. If the second threshold was used as the requirement, then the detected difference would have to surpass the second threshold value including the range between the first and second threshold values in order to detect a difference.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1,2,5-7,9,10,13,15-21 and 24-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Kuwabara (US Patent 6,980,686 B2).

Regarding claim 9, Kuwabara discloses an apparatus for detecting a defect on a substrate, the apparatus comprising:

a) a support (fig. 1,num. 18) for supporting a substrate, wherein the substrate has a plurality of device units formed thereon, each device unit including a plurality of pixels;

b) a light source (fig.1,num. 12) for irradiating a light on the substrate;

c) an image detector (fig. 1,num. 17) for sensing a reflecting light reflected by a surface of the substrate from the light source;

d) a data processing unit (fig.1 ,num. 21) for calculating a raw datum of a target pixel by subtracting digital image information of a corresponding pixel from digital image information of the target pixel, wherein the corresponding pixel is located in a first device unit that is adjacent to a second device unit that includes the target pixel, the corresponding pixel corresponding to the target pixel;

e) a setting unit (fig. 3,num. 103) for presetting a threshold region, wherein the threshold region includes at least one pair of upper and lower limits; and

f) a judging unit (fig. 3,num. 104) for judging whether or not the target pixel is a defective pixel by comparing the raw datum of the target pixel with the threshold region.

Regarding claim 1, Kuwabara discloses a method of detecting a defect on a substrate, the method comprising:

a) irradiating (fig. 1,num. 18) a light on a substrate, wherein the substrate has a plurality of device units formed thereon with the same pattern (fig. 2A), the plurality of device units each including a plurality of pixels;

b) measuring image information (as indicated in fig. 2A: "COMPARED") for the plurality of pixels by sensing the light reflected by a surface of the substrate from the irradiating light;

c) calculating a raw datum (fig. 3,num. 102 and see paragraph 3, above) of a target pixel by subtracting the image information of a corresponding pixel from the image information of the target pixel, wherein the target pixel is a subject pixel for detecting a defect, and wherein the corresponding pixel is located in a first device unit that is adjacent to a second device unit that includes the target pixel, the corresponding pixel corresponding to the target pixel;

d) presetting a threshold region (to obtain a "fixed threshold" in col. 3, line 57) including at least one pair of upper and lower limits (or "second threshold value, which is larger than the first threshold value" in col. 5, lines 62,63 and see paragraph 2, above);

e) comparing the threshold region with the raw datum (fig. 3,num. 104); and

f) marking the target pixel (fig. 3,num. 107) as defective if the raw datum is within the threshold region (or "greater" in col. 3, line 58).

Claim 19 is rejected the same as claim 1. Thus, argument similar to that presented above for claim 1 is equally applicable to claim 19.

Regarding claim 2, Kuwabara discloses the method of claim 1, wherein the substrate includes:

a) a wafer (fig. 1,num. 19) for fabricating a semiconductor device, and

b) the plurality of device units (fig. 2A) are unit cells operating as independent electronic circuits on the wafer.

Regarding claim 5, Kuwabara discloses the method of detecting a defect on a substrate of claim 1, wherein the image information includes binary digital information (fig. 7,num. 205: 2-BIT IMAGE).

Regarding claim 6, Kuwabara discloses the method of detecting a defect on a substrate of claim 5, wherein the image information represents a level on a gray scale (corresponding to fig. 7, num .201: GRAY LEVEL IMAGE DATA), wherein the gray scale is distinguishable by a relative density of black and white.

Claim 7 is rejected the same as claim 6. Thus, argument similar to that presented above for claim 6 is equally applicable to claim 7.

Regarding claim 10, Kuwabara discloses the apparatus of claim 9, wherein

a) the substrate is a wafer for fabricating a semiconductor device and

b) the plurality of device units are unit cells operating as independent electronic circuits on the wafer.

Claim 13 is rejected the same as claim 6. Thus, argument similar to that presented above for claim 6 is equally applicable to claim 13.

Regarding claim 15, Kuwabara discloses the apparatus of claim 9, wherein the image detector includes a photo-sensor (fig. 1,num. 17).

Regarding claim 16, Kuwabara discloses the apparatus of claim 9, wherein the image detector generates the analog image information for each pixel of each device units (fig. 1).

Claim 17 is rejected the same as claim 16. Thus, argument similar to that presented above for claim 16 is equally applicable to claim 17.

Claims 18 and 21 are rejected the same as claim 1. Thus, argument similar to that presented above for claim 1,line 3 is equally applicable to claims 18 and 21.

Claim 20 is rejected the same as claim 1. Thus, argument similar to that presented above for claim 1,last limitation is equally applicable to claim 20.

Claims 24-26 are rejected the same as claims 5 and 6. Thus, argument similar to that presented above for claims 5 and 6 is equally applicable to claims 24-26.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 3,4,11,12,22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuwabara (USPatent 6,980,686 B2) in view of Spaeth (US Patent 2,349,012).

Kuwabara does not teach the limitations of claim 3, but teaches using a illuminating light as shown in fig. 5 which suggests to one of ordinary skill in the art of light sources a selection of light sources.

Spaeth teaches a light source and the remaining limitation of claim 3 of

a) the irradiating light includes a short-wave light ("shortwave ra-diant energy" page 5, right column, lines 40,41).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to use Spaeth's teaching of shortwave radiant energy with Kuwabara's teaching of the illuminating light, because Spaeth's teaching can generate an "illuminating light source of high efficiency" in page 5, right column, lines 43,44 using the shortwave radiant energy.

Claim 4 is rejected the same as claim 3. Thus, argument similar to that presented above for claim 3 is equally applicable to claim 4.

Claims 11,12,22 and 23 are rejected the same as claims 3 and 4. Thus, argument similar to that presented above for claims 3 and 4 is equally applicable to claims 11,12,22 and 23.

8. Claims 8,14 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuwabara (US Patent 6,980,686 B2) in view of Lin et al. (US Patent 6.091,846).

Regarding claim 8, Kuwabara does not teach claim 8, but teaches a "visual inspection" in col. 4, line 46 and an ADC system that is "Conventionally" in col. 4, line 45 used.

Lin teaches an "ADC" in col. 19, line 31 system and visual inspection using "visual characteristics" in col. 31, lines 54,55 as suggested by Kuwabara and claim 8 of:

a) displaying the defective pixel on a monitor (or "displays...defect images" in col. 7, lines 1-3).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Kuwabara's teaching of ADC and visual inspection with Lin's teaching of displaying defect images, because Lin's teaching enables an operator "to obtain an overall view of defect patterns and trends, or to diagnose specific defects" in col. 7, lines 3-5.

Claims 14 and 27 are rejected the same as claim 8. Thus, argument similar to that presented above for claim 8 is equally applicable to claims 14 and 27.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Adler et al. (US Patent 7,171,038 B2) is pertinent as teaching a method of a plurality of threshold regions as shown in fig. 8.

Sakai et al. (US Patent 7,142,708 B2) is pertinent as teaching a threshold region as shown in fig. 4d.

Tanaka et al. (US Patent 7,116,816 B2) is pertinent as teaching a method of a threshold margin as shown in fig. 3,num. 28 among other threshold margins shown a plurality of times in other figures.

Potucek et al. (US Patent 6,498,867 B1) is pertinent as teaching a method of upper and lower thresholds as shown in fig. 8D;numerals 256 and 252.

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario whose telephone number is (571) 272-7397. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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